FACE TRANSPLANT has emerged from ethical debate to surgical reality. Nine face transplants have been realized in the world in the last four years. However, collecting data is difficult, and only long-term follow-up will show the real indications and risks. The place of face transplant in the future of plastic surgery is thus unclear. However, all plastic surgeons confronted with improbable cases have thought of face transplant as a possible solution.

Looking back at our first case with two years of follow-up, it is clear that in selected cases the results can be excellent with minimal immunosuppressive treatment. This patient, who had neurofibromatosis, was the modern “elephant man.” He had multiple operations by very skilled plastic surgeons, with no results. After his transplant, he was able to find a job and go back to a normal life.

But how did we get to this point? We should first go back in history to see where reconstructive surgery started and what are the challenges that we face today.

Before the Renaissance, surgeons were on the battlefield showing their skill in quickly removing bullets and cutting off legs, competing to be the most efficient. Then came anatomy, brought to us by Andrea Vesalius (1514–1564) in its founding book De Humanis Fabrica. With this knowledge of the constitution of the body, Ambroise Paré (1510–1590) in France first showed that ligature of blood vessels could be more efficient than the burning of a wound as a means of avoiding bleeding, and showed how to know which internal organ could be damaged just by looking at bullet wounds in a scientific manner from which today’s experts could learn. But the mysteries remained. As he
said, “I do the dressing, but God does the healing.” He showed us the way to repair, not to reconstruct. Gaspare Tagliacozzi (1545–1599) is considered the first reconstructive surgeon of Western countries. He is well known for his nose reconstruction by harvesting a flap on the arm of a patient. Once raised, the flap was brought to the face and sutured while still attached to the arm. The patient would stay in this uncomfortable position for three weeks. The distal part of the flap was then divided, and the flap, still attached to the nose, was shaped to form a new nose.

The English brought another technique to Europe in the eighteenth century, during the conquest of India. An amputated nose could be reconstructed from a forehead flap that was rotated and shaped to form a nose. This strange procedure, published in the Gentleman’s Magazine in 1794, came into competition with Tagliacozzi’s “Italian graft,” and during all the nineteenth century those two techniques were used.

The First World War brought to surgery numerous patients, who founded in France the “gueules cassées” (broken faces) association. Most of them were treated in the Val-de-Grâce Hospital in Paris, where the casts of those broken faces can still be seen. Hippolyte Morestin (1869–1919) was the facial surgeon in the Val-de-Grâce. He developed numerous techniques, some of which are still in use today. He died of the Spanish flu and was followed by other surgeons like Harold Gillies (1882–1960), who is considered by the English-speaking countries to be the father of modern plastic surgery. The Second World War brought numerous facial injuries. Most of these injuries involved burns of the face and hands. The pilots of the RAF made up a large part of the patients. Sir Peter Medawar (1915–1987), who received the Nobel Prize in 1960, studied the immunology of skin grafting. After World War II, other techniques were developed to improve facial reconstruction. Paul Tessier (1917–2008) in France showed the world how to cut the facial bones to advance the face or move the orbits.

In the late seventies, following the work of Harry Buncke (1922–2008) in the U.S., the field of reconstructive microsurgery was developed. This innovation used special instruments and magnification devices and allowed the repair of vessels less than one millimeter in diameter. At first this was used to replant fingers, but it was also applied to other amputated elements, as in cases of scalp avulsion. Combined with the knowledge of skin and vascular anatomy, it allowed surgeons to transplant from one part of the body to another vascularized elements of skin, muscle, or living bone. For instance, the fingers could be reconstructed with toes, the mandible with vascularized fibula or iliac crest, the breast with the skin and fat of the lower abdomen, and so on. The combination of all these techniques could lead to modern facial
reconstruction, which was very satisfying in most cases, but in a few cases unfortunately failed to give a normal appearance to the patient.

Parallel to the development of modern plastic surgery, transplantation of organs was developed. The internal organs first transplanted were the kidney (in 1954 in the U.S. by Murray and in France by Küss), the liver (by Starzl in 1963), and the heart (by Barnard in 1967 following Shumway’s work). Gilbert in South America performed the first hand transplant at the same period in 1964. Although the technical aspects were perfectly managed, rejection occurred in all these first transplants, leading to failure in all but a very few cases. Knowledge of immunology led to new drugs and allowed successful development of organ transplants, but it was only in 1998 that a team led by J. M. Dubernard in France, quickly followed by an American team led by Warren Breidenbach, performed successful hand transplants. After this transplant in France a debate in the national ethics committee concluded that if a transplant could be used for a non-vital purpose, as in hand transplant, the handicap should be sufficient to justify lifelong immunosuppressive treatment. Therefore, in France only bilateral hand transplant is allowed by the agencies that regulate organ donation.

However, a face is not a hand. After a few teams announced that face transplant was feasible, a lot of debate arose on the opportunity for such transplants. Most of the debate was poisoned by a fantasy view of what face transplant is, especially after movies like *Face/Off* (1997) or *Eyes without a Face* (1960), which showed face transplant as the shifting of faces, rather than the reconstruction of faces, which is what we do. Several ethicists declared that such procedures should not be done for ethical reasons, because the side effects of the treatment would be too significant and because no one could endure the psychological impact of carrying someone else’s face. We think that only clinical experience can answer these questions. The question is not “Can we do a face transplant?” but “Should we do a face transplant?” Clinical research alone can answer that question, because it follows strict ethical guidelines dictated by the fundamental texts of Nuremberg and Helsinki.

A face is not a hand, but is without doubt an organ. Besides basic functions like eating and breathing, it allows its most fundamental function, which is communication. In 2002 we presented this point to the French national ethics committee, trying to explain the goal of such transplants. Its conclusion, given several months later, was that a face transplant should not be presented as a total shift of the face, but mostly as reconstruction of several non-reconstructible elements. Two words are used in French: *le visage*, which is the clinical face with its expression and personality, and *la face*, which is the “anatomical face.” These elements are mostly the circular muscles of the face, which can
be found in the mouth (orbicularis oris) and the eyelid (orbicularis oculi). Total destruction of the orbicularis oris can be found in several conditions, such as trauma (mostly ballistic traumas) and some rare tumors. Total destruction of the eyelid on both sides is found only in very rare burn patients. These defects are most of the time combined with other defects, for example, of the nose, that may or may not involve the underlying bones.

One of the recommendations of the National Ethics Committee was that if such a procedure should be performed, it should be considered as clinical research. We then started the redaction of a clinical research protocol. Several aspects were studied. The first was the technical elaboration of the transplantation. These technical details were elaborated by performing numerous dissections on cadavers in the anatomy laboratory. Some details had to be developed to integrate our harvest in a multi-organ harvest procedure and to restore the body at the end of the procedure. The second aspect is the immunological protocol. A lot of research has been done to find a treatment that would lead to immunotolerance with minimal, or no, immunosuppression, but most of these protocols, even if they are efficient in animals, have not shown any efficiency in humans. Here we only followed the protocol elaborated in humans with other composite tissues, such as the hand transplant.

Last was the ethical aspect. Of course, the risks involved in such a procedure raise ethical questions, but as in any innovative procedure only clinical research can clearly answer such questions. An important step in this operative protocol was the restoration of the donor, which was achieved by elaborating a mask using a mold made from the donor’s face before the harvest. Even though it is an obligation under French law to restore the body, this aspect did not seem to be an evident necessity at first. People argued that, aside from the cost of such reconstitution, a lot of donors did not care about what happened to their bodies after death and had chosen to be cremated. For us this reconstitution is an ethical requirement. It is important to see that respect for human dignity and image goes beyond death; therefore, particular care should be taken in the restitution of this dignity. This aspect is the condition for obtaining the cooperation of families and of organ procurement agencies to obtain organs.

Our clinical research protocol was elaborated to evaluate the feasibility, reproducibility, risks, and benefits of facial CTA. It is an open study on five cases, in which each indication is approved by an independent expert committee with strict inclusion and exclusion criteria. Improvement in terms of quality of life versus the side effects of the treatment is evaluated, as is the impact on organ donation. Our first case, in January 2007, was that of a very severely disfigured patient
who suffered from Von Recklinghausen disease. His deformity was so severe that people looked at him as though he were an elephant man. Even with an accounting diploma, he was not able to find any job, and he had major difficulties in going outside for shopping or eating in a restaurant. Two years after his transplant, he had found a job and was anonymous in the crowd when traveling in the Paris subway. This transplant involved the lower part of the face. Since then two other patients with gunshot injuries were operated on by our team in March 2009 and August 2009, with good results. Of course, when people speak of face transplants everybody thinks of burn patients; however, the indication is limited there to the very severely disfigured cases in which not only the skin, but also the underlying muscles are destroyed. These patients have not only facial injuries, but also hand injuries, and have already sustained multiple surgery and grafts with multiple infections. We operated in April 2009 on a patient who was caught in a fire in his cave in 2004. That resulted in a 75% surface body burn and the destruction of both eyelids and all the fingers. A transplant of all the face except the lips, including the scalp and the ears, was performed, combined with a bilateral hand transplant. Though the initial result was a success, allowing the patient to have a normal face and move his fingers, a progressive infection destroyed the graft, and the patient suffered cardiac arrest during an operation to save his graft. The infection was probably due to bacteria present in the patient since his injury.

The main issue is not the success or failure of such procedures, but finding the right balance between risk and benefits. Our attempt to do double hand and face transplant has been recognized as an honorable attempt to cure an incurable condition. This is not different from the other attempts at organ transplantation. Moreover, after presentation of this case to the French society for burn care, all the physicians who care for burn victims recognized that it was a breakthrough that offered new hope to their patients. In fact the progress made in burn reanimation has led to success in incredible cases in which burns over more than 90% of the body resulted in such suffering that some patients had attempted suicide. Though it is very risky, the new possibility of giving back autonomy, normal appearance, and human dignity justifies the ethics of reanimation of severe burn injuries. Some have argued that face transplant is a life-threatening procedure; we say that it is a life-saving procedure.

Today nine patients around the world have benefited from face transplant. All of them are civilians, but as in both world wars it is

---

2Since 2009 several other facial transplants have been made, with a total of fifteen. Six of them have been performed by Professor Lantieri’s team.
probable that numerous soldiers wounded in the war in Iraq could
benefit from this new approach. Even if the procedure is highly experi-
mental, these patients have the right to the opportunity of getting into
a civilian research protocol and benefiting from these innovations.

Around the world other patients are on waiting lists, but the prob-
lem of donation persists because procurement organizations do not re-
ceive information about the usefulness of these kinds of transplantation.
Regulation of organ donation is different in each country. In France,
the principle is “supposed consent,” which means that if you are not
registered as an opponent of organ donation you are a donor. It is an
expression of solidarity. But the French law was enacted before the first
hand and face transplant. It is obvious that internal and external or-
gans cannot be considered the same for donation. Before death every
body is conscious of its external organs, but not of its internal organs.
After death the family has this consciousness. It is then logical to ask
the family when the donor has not made his intention clear.

It is highly improbable that face transplant could be developed in
only one country and that competition between several countries would
be efficient in developing this rising field. We advocate strong trans-
atlantic cooperation, which would lead to a common database, pro-
spective evaluation, and the sharing of cases to develop the standard for
indication, technique, and immunosuppressive treatment in face trans-
plant. Face transplant is a necessity to restore humanity to some men and
women. It is thus a necessity for humanity to accept face donation.